DOCUMENT RESUME

ED 291 684 SP 029 830

TITLE	How Do We Know What Teachers Know?
INSTITUTION	National Center for Research on Teacher Education, East Lansing, MI.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	87
NOTE	21p.
PUB TYPE	Reports - Descriptive (141) -- Collected Works - Serials (022)
JOURNAL CIT	Colloquy; v1 n1 Fall 1987
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Academic Standards; Elementary Secondary Education; *Evaluation Methods; Measures (Individuals); *Standardized Tests; *State Standards; Teacher Certification; Teacher Evaluation; Test Construction; *Testing Programs

ABSTRACT

The three articles in this newsletter focus on questions of what teacher knowledge consists of and how it can be measured. Three contemporary efforts to assess teacher knowledge, each with a different purpose, are presented. The first, based on a report of the Office of Educational Research and Improvement, summarizes state assessment efforts and issues raised by such efforts. The second article describes Michigan State University's National Center for Research on Teacher Education's approach to instrument development, detailing how the organization conceptualized what teachers need to care about, know, and be able to do to teach mathematics and writing effectively, and how the development of instruments to assess teachers' learning is approached. The question of what it means to be prepared to teach an academic subject is also addressed. The final article offers an interview with Lee Shulman of Stanford University (California) who describes his ongoing work with the Carnegie Forum on Education and the Economy, which is developing assessment prototypes for a national board examination of teachers. (JD)

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NCRTE Colloquy

NATIONAL CENTER FOR RESEARCH ON TEACHER EDUCATION

Michigan State University, East Lansing, MI Vol. 1 No. 1, Fall 1987

ED291684

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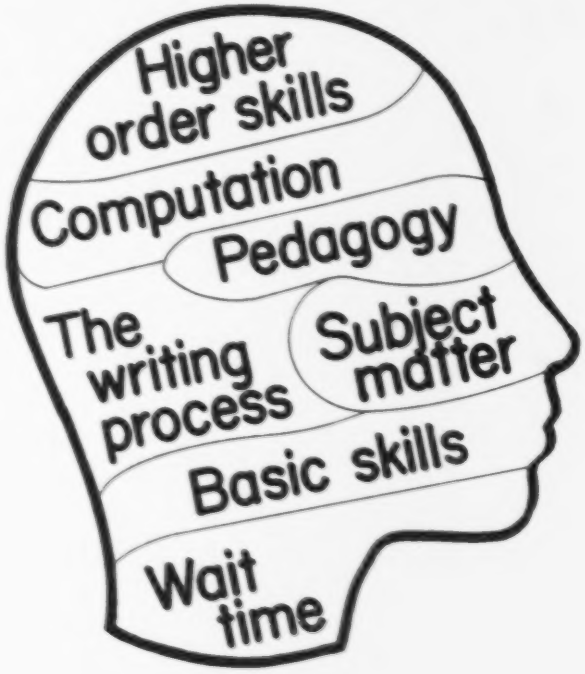
How Do We Know What Teachers Know?



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The National Center for Research on Teacher Education is committed to research that will contribute to the improvement of teacher education. Headquarters are at Michigan State University, an institution with a history of innovative programming in teacher education.

In pursuit of its mission, the NCRTE cooperates with teach educators engaged in a variety of approaches and alternatives to teacher education. The programs they represent are listed below.

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Elementary Education and Secondary Program for Mathematics
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NCRTE Colloquy is published by the National Center for Research on Teacher Education, College of Education, Michigan State University. The NCRTE is funded primarily by the Office of Educational Research, U. S. Department of Education. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the Office or Department. Third-class postage is paid at East Lansing, MI. Please send change of address notification to National Center for Research on Teacher Education, College of Education, Michigan State University, East Lansing, MI 48824-1034. Please include the address label from this issue.

INTRODUCTION TO *COLLOQUY*

The National Center for Research on Teacher Education, funded by a grant from the Office of Educational Research and Improvement, Department of Education, is committed to examining the relationship between teacher education and teacher learning.

The Center's research agenda can be characterized by three critical features. First, it contrasts two academic subjects (mathematics and writing) in order to increase our understanding of the relationship between subject matter and pedagogy in learning to teach. Second, it includes a variety of approaches and alternatives to teacher education in the sample, so that we can see the different ways in which teaching may be learned. Third, it documents changes in teachers' knowledge, skills, and dispositions as they participate in these programs, so that we can see the relationship between educational experiences and changes in knowledge.

Study Design

The Center's work consists of case studies of a variety of approaches and alternatives to teacher education combined with longitudinal studies of teachers as they participate in these programs and enter their teaching. We include undergraduate and graduate-level preservice programs, alternative routes to teaching, and inservice programs. These approaches differ in the relative emphasis they place on liberal arts studies, formal study of pedagogy, and guided practice. They also differ in the way they treat academic subject matter and pedagogy.

The longitudinal studies will enable us to examine changes within individuals over time (e.g., in knowledge of mathematics and writing and in knowledge about how to teach these subjects) and to see whether or how these changes are related to particular kinds of learning opportunities, such as practicum experiences, methods courses, or on-the-job experiences.

The First Issue of *Colloquy*

Colloquy, the NCRTE's newsletter, is devoted to examining important issues in teacher education. Each issue will provide different perspectives and points of view on a particular topic. Articles will present research findings as well as debates. The first issue focuses on questions of what teacher knowledge consists of and how it can be measured. We highlight three contemporary efforts to assess teacher knowledge, each with a different purpose.

Forty-four states now require some form of teacher certification exam. One article, based on a report of the Office of Educational Research and Improvement, U. S. Department of Education, summarizes state assessment efforts and issues raised by such efforts.

The NCRTE is about to launch its study on new efforts to assess teacher knowledge. Another article, by Deborah Ball and Bill McDiarmid, describes NCRTE's approach to instrument development, detailing how we conceptualized what teachers

Photo by Dorothy Prewat

Mary Kennedy
Director

Prior to becoming director of the NCRTE, Mary Kennedy directed a number of large-scale studies, including the congressionally-mandated National Assessment of Chapter 1, completed in preparation for the 1987-88 reauthorization of Chapter 1. Throughout her career, Kennedy has taken particular interest in research methodology and in the relaship between research and practice.

need to care about, know, and be able to do to teach mathematics and writing effectively and how we approached the development of instruments to assess teachers' learning. The authors address the question of what it means to be prepared to teach an academic subject.

The National Board for Professional Teaching Standards was established on May 15. It will be issuing certificates to teachers who demonstrate they meet standards that can be measured. Our third article, an interview with Lee Shulman of Stanford University, describes Shulman's ongoing work with the Carnegie Forum on Education and the Economy, which established the board. Shulman is developing assessment prototypes for a national board examination for teachers.

Mary Kennedy

STATE ASSESSMENT EFFORTS

by Sandra Gross, Editor

Concern About Quality of Education

Lawrence Rudner

Responding to reform efforts at the national level (e.g., Carnegie Forum on Education and the Economy, National Commission for Excellence in Teacher Education, the Holmes Group Consortium), 48 states have implemented or plan to implement some form of teacher certification testing. Through these efforts, states hope to restore public confidence in the educational system and to keep unqualified people out of the profession. In the late 60s and 70s, concern about the quality of education led to student testing on a large scale. Since then, media coverage and the widespread perception of the public that schools were not educating students led to concerns about teacher competence.

A new report from the Office of Educational Research and Improvement of the U. S. Department of Education surveys the current status of state assessment efforts (Lawrence Rudner, Ed., *What's Happening in Teacher Testing: An Analysis of State Testing Practices*, 1987). The report points out that, by 1987, some 44 states had initiated written certification test requirement, 39 had considered or initiated an induction program with an assessment component, and 27 had initiated an admissions test for teacher education. The report provides a state-by-state review of admissions and certification testing, as well as a series of papers reviewing social, legal, and technical issues of teacher assessment. This article summarizes some of the issues examined in the report.

Resumption of Testing Supported

In a paper on "Historical Perspectives," J. T. Sandefur of Western Kentucky University traces the background of the return to teacher testing. In the late nineteenth century, he points out, states and counties administered tests for licensure to assure that high school graduates were qualified to teach. State testing faded away as educational requirements for teachers were increased, leading finally to an undergraduate degree comprised of general education, academic specialties, and pedagogical instruction. The current return to teacher testing began in the south with seven states and has spread to the west and northwest. Initially teacher testing programs were mandated by state legislatures, but in the last five years they have been mandated by state boards of education.

Rudner, the editor of the volume, points out that many stakeholders in education--the public, teachers educators, teachers, and their professional organizations--support the concept of teacher testing, although they disagree on who should be evaluated, what should be evaluated, and how evaluation is conducted.

What are the tests measuring? How are these tests developed? Are performance assessments a valid alternative? These are the questions that are addressed by the researchers contributing to Rudner's volume.

What is Tested?

In a paper entitled "Content and Difficulty of a Teacher Certification Examination," Rudner details the skills assessed by tests, how the tests are evaluated, and how passing scores are set. The NTE, formerly referred to as the National Teachers Examination, under the aegis of the Educational Testing Service, has served as a model for other paper-and-pencil tests and consists of a core battery and exams covering specific subjects. The core battery of the NTE and most certification tests measure general knowledge, professional knowledge, and communication skills. General knowledge includes reading, writing, mathematics, literature, and fine arts. Communication skills deal with listening and receiving feedback. Professional knowledge addresses classroom management, student assessment, and legal matters. The NTE, as do other certification tests, provides specific tests in subject matter areas.

Rudner points out that such tests do not address a number of dispositions that may be important to teaching, such as dedication, caring, and perseverence. Nor do paper-and-pencil tests measure actual teaching ability.

How Are Tests Developed?

Test developers may rely on either content-related and/or criterion-referenced evidence to establish the validity of a test.

Content-related evidence refers to evidence that the material is related to the job of teaching. In a technical appendix, James Algina and Sue Legg, University of Florida, point out the importance of being clear about what the job is--is it teaching in general, acceptable practice for entry-level teachers, or effective teaching? Even if one goes through the test validation procedure of examining the tasks and the curriculum, should job-relatedness be the main basis for developing a test of basic skills? Parents, for example, may want teachers to have higher skills in mathematics and writing than those required for "adequate" job performance.

In a paper entitled "Legal Considerations," Martha McCarthy, Indiana University, reviews the legal challenges to testing and the principles for assessment that courts have established. Courts have determined that tests can be used for teacher employment decisions if the content is job-related and if the test is constructed and validated by professionals. Test content is usually validated by panels of teachers, teacher educators, and administrators appointed by state boards of education. Rudner, in his paper on test content, says these panels consider whether there is a match between the test and what prospective teachers learn in a standard

teacher education program. They consider whether skills covered by the test are relevant to the job, but not whether all crucial job elements are reflected in the test.

Criterion-related evidence refers to evidence that successful test performance is related to successful teaching. Certification practices often rest on the assumption that higher test scores are related to better teaching practice and that teachers certified by tests will have stronger positive effects on their students.

Although such criterion-related evidence might yield tests with predictive value, critics state that it is difficult to obtain valid criterion data because teachers work in a wide variety of situations and that measures of teacher performance have not yet been well developed. Algina and Legg are optimistic about the possibility of finding common criteria; low-inference measures are already being developed that may prove useful.

How Are Standards Set?

Standard setting is the process of determining the minimum score needed for certification. Typically, a panel of experts determine the test performance that should be expected from a person of minimal competence. Although these practices give the appearance of establishing an objective cut-off score, they actually derive from professional judgments, rather than from evidence that such scores are associated with particular levels of teaching skill. Rudner's paper on test content and difficulty notes that some states set the cut-off score to guarantee a supply of teachers, while in others it has become necessary to issue emergency certificates to handle shortages created by the test. In most cases, states set a lower cut-off score than the panel of experts recommends.

Are Performance Assessments a Valid Alternative?

Besides paper-and-pencil tests of teacher knowledge, seven states have developed performance assessment tests for the beginning teacher. In a paper on "Assessment of the Teaching Skills of Beginning Teachers," Gary Galuzzo of Western Kentucky University reports that two methods are usually employed for developing classroom observation instruments. In the "consensus" method, a cross-section of community, professional, and some lay people generate a list of competencies and then agree on those that should be valuable for a beginner to attain. They assume that these can be observed in the classroom. The "research review" method has a group of educators reviewing the literature to come up with a list of research-informed competencies to indicate effective teaching. These competencies have typically already been observed with instruments developed for research purposes.

While performance assessments are not identical, Galuzzo finds that they cover a common list of aspects of teaching, ranging from planning for instruction to presentation to classroom management. Their emphasis parallels items in the

professional knowledge section of the NTE. Four states include human relations skills and professional behavior and three include student evaluation, items also tested in the professional knowledge portion of the NTE. Constitutional rights of students and extra-classroom influences on teachers and students are tested in the NTE professional knowledge section but do not appear in performance assessments.

Performance assessments are usually conducted by a supervisory committee that observes the intern and provides feedback. Committee members usually include the building principal, a teacher educator, and a supervising classroom teacher, all of whom receive extensive training in observing and using the performance assessment instrument. The make-up of the committee provides a link between teacher preparation programs and the needs of the schools. Performance assessment can influence the supervising teachers and teacher educators, as well as new teachers.

If the intern lacks essential skills at the end of the first year, there is usually another year to improve. If no improvement is shown, the intern may be terminated after the second year. Yet, Galuzzo continues, there is little evidence that interns who exhibit the specified behaviors will cause students to learn more. Observation instruments provide a glimpse of behavior in isolation and do not give a complete picture of either teachers or students.

Other Issues

All these efforts are designed to assure a quality teaching force, but their real impact is only beginning to be felt. An important paper by Bernard Gifford, University of California-Berkeley, entitled "Excellence and Equity" reviews both the evidence and the arguments regarding the use of such tests with minority teachers. Martha McCarthy's paper on "Legal Considerations" also addresses important issues about the role of tests. The most troublesome issue, however, is the extent to which these tests and performance assessments adequately reflect the qualities we want teachers to have. Ironically, most tests and performance assessments have been developed on the basis of armchair reasoning, with little evidence that the things they assess in teachers actually contribute to pupil learning.

State initiatives in the assessment of teachers and teaching have suddenly become big business. If you would like to learn more about issues related to state testing and performance assessment programs, contact Lawrence Rudner, LMP Associates, 3109 Rolling Road, Chevy Chase, MD 20815. Telephone (301)986 1531 or Eilene Nicosia, OERI, Room 303P, 555 New Jersey Ave., NW, Washington, DC 20208. Telephone (202) 357-6556.

Lawrence Rudner is the founder and president of LMP Associates, Chevy Chase, MD, a consulting firm concentrating on testing issues. Previously a senior associate with the Office of Educational Research and Improvement, Dr. Rudner's areas of expertise are test validity, measurement theory and computer applications.

UNDERSTANDING HOW TEACHERS' KNOWLEDGE CHANGES

by Deborah Ball & Bill McDiarmid

Photo by Kurt D. Kuhn

Deborah Ball

Photo by Dorothy Prusak

Bill McDiarmid

Much of the current debate about teacher education centers on what teachers need to know to teach academic subjects, where and how teachers can best acquire and develop that knowledge, and how teachers' knowledge can be assessed. The debate ranges over a variety of assumptions and perspectives. For instance, some educators and policymakers emphasize the importance of skills applicable to teaching all subjects and argue that these skills are best acquired through careful coaching by experienced teachers. Others claim that the best preparation for teaching is to study an academic discipline in depth and that any well educated person can teach. Proposed approaches to assess teacher competence range from checklists of skills to tests of subject matter knowledge.

The existing literature on the requirements of teaching and how teachers learn what they need is of little use in these debates about teacher knowledge and teacher learning. We do not know much about what is taught and learned in teacher education programs nor how formal influences on teacher knowledge (e.g., university courses) compare to nonformal influences (e.g., on-the-job experience). We lack information about how teachers who have undertaken professional preparation differ from those who have not. We also lack an understanding about the dimensions of teacher knowledge on which teachers must draw and the relationships among different kinds of knowledge for teaching. As a result, arguments for particular approaches to teacher education and attempts to measure teachers' knowledge are often unconvincing.

To inform current debates and curriculum reform in teacher education, the National Center for Research on Teacher Education is examining what teachers are taught and what they learn in 11 diverse preservice, induction, inservice, and alternative route teacher education programs. Our work combines case studies of programs with longitudinal studies of participants' learning. Before, during, and after the program, we will survey participants' beliefs, attitudes, and knowledge concerning the teaching of academic subjects to diverse students. A smaller sample of participants in each program will be periodically interviewed and observed as they teach.

A critical feature of our research design is the fact that we collect information on participants over time so that we can see whether and how their ideas or practices change and what factors seem to play a role in any such changes. Tracking these changes requires us to define as clearly and precisely as possible the types of knowledge and behavior that are likely to change during teacher education.

What Should We "Follow"?

The lack of consensus among our 11 programs on what teachers need to know and be able to do complicates our task. For instance, some programs emphasize subject matter knowledge while others emphasize general skills of teaching. Some programs urge teachers to let their pupils take an active role while others encourage teachers to structure time, space, and content.

Given such diversity, how could we develop strategies for tracking change that would be broad enough to encompass diverse points of view and still be sufficiently focused to detect subtle changes over time? Below we describe how we have resolved this dilemma.

Bounding Our Inquiry

Focusing on mathematics and writing. Initially, we made two decisions that helped to set some boundaries for our work. To learn more about the relationship between subject matter and pedagogy in teaching and learning to teach, we chose to study teacher learning in two specific areas: mathematics and writing. Not only do these subjects offer a contrast--they are also taught from kindergarten through high school and are subjects that pupils often have trouble learning. Since current school practices in math and writing classes frequently differ from those recommended by subject matter experts, these may also be areas on which some teacher educators concentrate.

Identifying competing conceptions of good teaching. Our second decision addressed the fact that different, even competing, visions of good mathematics teaching and writing instruction exist. To ensure that our instruments did not favor a particular conception, we needed to articulate the dominant conceptions of good math teaching and good writing instruction. If, for instance, we were to assume that teaching writing well meant focusing on mechanics and spelling, our instruments would contain primarily questions about teaching those conventions. Our chances of detecting changes in teachers who focus principally on the processes of composition would be diminished. Similarly, if we focused our instruments on a diagnostic-prescriptive approach to teaching mathematics, we would likely miss changes in teachers who were thinking about ways to involve students in small-group problem solving.

For both math and writing, we identified several distinct approaches to teaching and identified the knowledge and skills each approach required. We also identified the views of teaching, learning, and subject matter inherent in each approach.

What Goes Into Teaching?

To understand how teachers learn and change, we had to clarify what goes into teaching. When teacher educators or policymakers talk about teaching, they generally focus on knowledge and skills, often treating them as distinct categories. While useful for analytical purposes, this distinction conveys a

misleading impression that skills can exist independently of knowledge. Asking good questions and giving clear explanations, for instance, are often defined as skills, yet they draw on teachers' knowledge. Besides acknowledging the interdependence of knowledge and skills in teaching, we recognize that teaching involves other things as well. For example, decisions about when to ask particular types of questions depend on teachers' commitments and orientations. All these ingredients are reflected in teachers' dispositions--their tendencies to respond in certain ways under particular conditions.

While teaching is of a piece, learning to teach occurs unevenly over time. Prospective teachers, for instance, come to the university with ideas about what teachers do. While at the university, they acquire knowledge and skills in their subject matter areas. Formal study also shapes their ideas about teaching as well as their commitments and orientations. When they begin to teach, they continue to learn--about teaching, pupils, and subject matter. Our interest in teacher learning requires that we pay attention to changes that occur separately in teachers' knowledge, skills, and dispositions as well as changes in how they bring these ingredients together in their teaching.

Knowledge of What?

How could we sample relevant knowledge in each of these areas? Using our focus on learning to teach mathematics and writing, we worked through the following domains of teaching: subject matter and curriculum, context, learning and learners, teaching and the teacher's role--seeking to specify essential teacher knowledge, skills, and dispositions. In each of these domains, we have identified the specific questions most germane to our focus on the teaching of academic subject matter to diverse learners.

In thinking about subject matter, for example, we recognize that we need to know what teachers and prospective teachers understand about mathematics and writing and how they represent their understandings to themselves and to others. From any perspective on what constitutes good teaching, teachers draw on their personal knowledge of these subjects. We also recognize that we should pay attention to how teachers take contextual factors into account, including the community, the policies of the school district, the classroom setting, the cultural backgrounds of the students, and the time of day or year.

In thinking about what teachers need to know about learning and learners, we focus on teachers' knowledge of pupils of different ages, developmental levels, and backgrounds, as well as their knowledge of their own pupils. We have also identified critical questions about teachers' ideas of what it means to "learn" something, of how learning occurs, as well as of what their responsibilities as teachers are.

In the area of teaching, we are interested in teachers' ways of working with pupils: their repertoire of strategies for helping students learn mathematics and writing that include attending to the diversity of learners in the classroom, figuring out what pupils know, and deciding what to do in the classroom and doing it. In addition, we recognize that we should tap teachers' ideas about what they need to learn and how they believe they can learn it.

We have kept in mind that ideas about what teachers need to know in any of these areas vary from one perspective on good teaching to another. For instance, according to one view, the teacher's role is to present clear explanations of mathematical concepts and procedures; according to another view, students must actively construct these understandings for themselves. While these clearly differ, both reflect points of view about what teachers need to know about learning and about their role as teachers.

Strategies for Tracking Teacher Learning

To track teacher learning, we developed three instruments: a questionnaire, an interview, and a guide for observing in classrooms. The questionnaire taps teachers' beliefs and knowledge about the dimensions outlined above. For example, to get at respondents' ideas about learners, we ask them to evaluate a number of mathematics and writing tasks and to indicate the tasks they believe are beyond the grasp of most six- to eight-year-olds. To elicit the knowledge of mathematics and writing on which they might draw in teaching, we ask subject matter questions embedded in teaching scenarios. One such scenario, for instance, asks respondents to evaluate the reasonableness of an unusual student response in mathematics.

The interview is designed to explore our participants' views about teaching, to learn what factors they consider when performing teaching tasks and their views about helping pupils learn mathematics and writing. We have developed the interview questions around tasks of teaching, such as appraising students' written work, planning an activity or lesson, and responding to a pupil's question.

Our observation instruments include an observation guide as well as pre- and post-observation interview schedules that enable us to set what we observe in the context of the teachers' overall goals and practice.

Conclusion

In developing measures of teachers' knowledge and skills, the Center has faced the same issues as have others who have attempted to develop instruments to assess teacher knowledge and skill: what knowledge is relevant, what constitutes good teaching, and how to develop strategies to find out what teachers know and can do. The way we have addressed these issues reflects our dominant purpose as researchers investigating how teachers learn, rather than as policymakers developing strategies for measuring teacher competence or

Photo by David Kelp

granting teacher licenses. Unlike other assessment efforts, we do not need to define standards for teaching performance. Instead, our instruments must be sensitive to different conceptions of good teaching. Moreover, since we are tracking changes in teachers over time, we are interested in the shifts that occur within particular dimensions--such as a teacher's beliefs about students, for instance--as well as in how teachers integrate different kinds of knowledge in teaching.

The data collection strategies we have developed, combined with our longitudinal research design, will help us understand what people learn from a variety of experiences--prior school and on-the-job experience as well as formal teacher education. Through questionnaires, interviews, and observations, we will be able to record changes over time in teachers' and prospective teachers' thinking and teaching. At the same time, we will be learning what programs are doing through interviews with program personnel, analyses of course and program documents, and observations of classes and workshops. Putting together data about the programs with information about teachers and prospective teachers will enable us to address our central research question: What is the relative impact of different kinds of teacher education programs on what teachers learn?

Deborah Loewenberg Ball is a senior researcher at the NCRTE. Also an elementary mathematics teacher, her interests focus on the role of subject matter knowledge in learning to teach.

Bill McDiarmid is an associate director of the NCRTE and a faculty member in the College of Education at Michigan State University. His interests include preparing teachers for multicultural classrooms and the role of context in teaching.

INTERVIEW: SHULMAN ON NATIONAL CERTIFICATION

by Mary Kennedy

(Lee Shulman is a professor at Stanford University. He currently has a grant from the Carnegie Corporation to develop prototype assessments of teachers. Carnegie hopes these prototypes can be used by its newly formed National Assessment Board to develop methods for assessing teaching competence. NCRTE Director Mary Kennedy interviewed him to learn more about the assessment system he envisions.)

How do you envision a national certification board-working? When would teaching be assessed, who would do it, and what would be the consequences of the assessment?

Those are hard questions, Mary, because the board itself has just been established, and it's going to be their responsibility to make these decisions. Given that we don't yet know what the character of its deliberations is going to be, the way I answer this question is going to be pretty much pure speculation. But it's speculation that we have engaged in because, in order to do the work we're doing, we have to make some guesses that at least permit us to stipulate "If the board does such-and-such, then this is the kind of assessment that may follow."

Photo by Edward W. Souza

Lee Shulman

We've been working under the assumption that teacher education would occur at a university from four to five years, maybe six. Following that, at the completion of university work most states would grant some sort of provisional license that would permit someone to become the teacher of record for children; that increasingly you'd find across the states the mandate for a beginning year or two of supervised residency, toward the end of which you either get a permanent certification or tenure decisions are made--a whole bunch of other decisions are made at that point.

My own current conception of how the board might play out is that evidence could be accumulated about the capacities and performances of a candidate over time via several sources of data that would be accumulated in a portfolio or dossier of an individual, only one of which would be performance on conventional tests.

A second would be performance at a performance assessment center, where someone engages in teaching-like activities--via simulations, via responding to films or videotapes. The virtue of the assessment center is that it is standardized like a test, but the response mode is much more like the performance that you're trying to predict.

The third source I see is what we're calling documentation and attestation. I'm imagining a situation where, during teacher education or during a supervised residency, there would be a set of accomplishments that a candidate would have to demonstrate. Now, in something like obstetrics residencies, a candidate would have to demonstrate that he or she can perform certain kinds of deliveries--a normal birth, a caesarean section, a breech birth. These are absolutely essential for being a competent obstetrician. So you specify evidence of

these as a requirement of residency and obligate the residency director to oversee the performance and the satisfactory character of the performance before signing off on that particular accomplishment. Well now, imagine a board of teaching examiners establishing a whole series of such teaching benchmarks that have to be attested to. It wouldn't matter what the sequence was, but sometime during the period of teacher education and residency you would have to have someone attest to the fact that this teacher is able to, say, design and manage a cooperative small-group teaching activity in his or her subject area or whatever else was deemed necessary. This means that any workplace that wants to be able to provide the opportunity for board certification for its new teachers has to be prepared to provide these kinds of support services and opportunities for teachers.

And the fourth source of data we're thinking about would be direct observations by outside observers of classroom teaching, which is different than documentation--attestation. What I would envision would be that the observers would be mentors--the people at the school site--and teacher educators. They would not be evaluating teachers' work summatively. They would be doing formative evaluation to help you get up to standards. Their evaluations would always be helpful evaluations.

So at least that's the way I'm thinking about it now. Carnegie has not only permitted me, but encouraged me to think wildly about such things.

Do you concern yourself at all with the possibility that these ideas aren't feasible?

Do I worry about it? You better believe I worry about it constantly. But we also have to recognize that--to the extent that around the country state after state is mandating a supervised residency and talking about yoking some kind of assessment to the residency--things like this are going to go on. So it isn't as if we're creating something out of whole cloth. I think you have to boot-strap this sort of thing. You have to find good models, you have to publicize the fact, you have to train people. And if it works at all, it's going to take a generation. But you've got to start somewhere. Yeah, it's a hard problem.

You've given a lot of thought to the variety of kinds of knowledge teachers need, and you've pointed out that a great deal of teaching depends on normative principles. Have you thought about the influence a national board exam could have if it cannot assess important aspects of teaching?

Well, I assume there are parts that are not assessable. Let me make a couple of distinctions.

One is the distinction between the *capacity* to perform and the *actual* performance in a particular situation. At one level, you could say that the best possible way of assessing the teachers is to observe them teaching in classrooms. And yet, teaching in some classrooms is far easier than teaching in others. So, in some sense, you have to think separately

about assessing the capacity of someone to teach in general and observing actual performance in a particular situation. I may identify that someone is competent to teach in this situation even though I'm not prepared to certify that they have the capacity to teach in general.

Another set of differences: When we ask teachers and teacher educators to talk about the characteristics of a good teacher, the first cut they give you is a set of character traits and dispositions: empathy, love of children, patience. Do we have any accurate way of measuring them? For the most part, given our current conceptions of assessment, I'd say no.

A board would have to think about two things. One, are those the kinds of characteristics the absence of which would lead you to want to prevent someone from teaching? And, if that were the case and if there were no tests for it, where would you place the obligation to screen for those things? I think I would place that obligation in the teacher preparation program. And, at the latest, within a residency. I don't think the inability to test for something becomes a serious threat to the usefulness of the assessment unless you treat what you can't test as somehow unimportant.

So anyway, yes--I don't think that all these are going to be equally well assessed in the narrow sense of assessment; they won't even all be equally assessable in the broader sense of documentation. Loving children--I love some children; I don't love others. How are you going to weigh that? Those are very hard questions. I really have not tried to grapple with those yet.

What happens to the teacher who pays for a teacher education, who endures a residency and then fails the national board exam? This person has already committed a lot to this career.

That would be a very good question. If there were things you either must have or you can't teach, then there should be an obligation of the teacher education programs or residencies to get as reliable an assessment of these as early as possible in the process. And about the only one I can imagine that I wouldn't feel that way about would be abusive or unethical behavior with kids. If, for some reason, there was no evidence of this earlier on and then late in the residency you see someone behaving dishonestly, unethically, or abusively with children, and document that--I would feel no misgivings at all about the standard being applied. But otherwise, I think your point is very well taken.

You've emphasized pedagogical content knowledge a lot in your writing and in your speaking, and I'd like for you to talk a little bit about what you mean by that term and how that is assessed.

The notion of pedagogical content knowledge emerged from our earlier research. We found that it was generally insufficient for teachers to take what they already knew and deliver it to students a la Federal Express. They had to learn to represent their understanding in some new ways, communicate in new

forms, in order to make possible student learning. Much of our research has been an attempt to understand what this transformation entails, and we call the results of that transformation--what teachers come to understand about the particular topics they teach--pedagogical content knowledge. It takes the form of analogies and metaphors and examples and demonstrations--ways of adapting understanding to accommodate predictable or observed variations in student characteristics.

But what's exciting to us about this notion, despite the mouthful that it takes to say it, is that it should distinguish what someone who merely understands the subject matter knows from what someone who understands it for teaching purposes knows. And that's what it is that distinguishes teachers from non-teachers.

Now, how would you assess it? Well, I think the fundamental way in which you assess it is to create exercises or questions or problems that involve the teaching of something in particular to someone or some people in particular. You will not be able to assess pedagogical content knowledge if you're looking for general dispositions. You get it by saying to a teacher, "Imagine that you had to teach the following chapter on photosynthesis to a group of kids with these characteristics." Now you're eliciting pedagogical content knowledge, if it exists. The assessment does not focus on teaching; it focuses on the teaching of something to someone under some conditions.

One of the difficulties of metaphors is they carry excess meaning that we don't intend--they never are perfect. So to some extent, every time a teacher uses a metaphor, whether willingly or not, he or she is also misleading students a little. Now, it's possible that this could be a conscious decision on the part of the teacher, depending on the teacher's purposes for the lesson. It's possible also that it would be unintended. The extent to which you could assess a teacher's use of a particular metaphor would depend in part on your knowledge of the teacher's long-range purpose in the lesson. Is that something that an observer or a documenter can know about?

Probably not. You've probably given an example where, in the real world, there is a historical context to every act of teaching that can't possibly be captured in any assessment. From an assessment perspective, something that subtle would probably elude the observer. At a broader level, the unintended consequences of metaphor also provide an unavoidable feature of teaching. But it's also one of the reasons why you try to explain things in multiple ways. You try not only to use metaphor and analogy but also examples, demonstrations, formal definitions. And that's why, frankly, teaching with concrete objects is fairly easy, whereas when you get into abstractions, it gets more and more fuzzy and difficult. I'm not too much worried about that one for teaching. I think if we get to the point where that's a serious question and that means that we've solved all the simpler problems, I'll be very happy.

Suppose a teacher teaches fifth grade for two years during residency and then, at the board exam, gets a question on teaching first-grade students in a very different kind of school than this teacher had been teaching in. Do you think, if a teacher develops a repertoire of ways of transforming subject matter in a particular kind of school environment, that that repertoire would generalize to other environments?

That's a lovely question because it gets right to the heart of what it is that the assessment is supposed to certify someone for. If the claim is that the assessment is certifying someone's capacity to teach K through 6, then the fact that someone's experience has been limited to fifth-grade kids in the suburbs is absolutely no excuse for why they cannot demonstrate the capacity to teach third-grade kids in an urban center. Now, if I'm evaluating you for the purpose of hiring you to teach a fifth-grade classroom or I want to give you tenure as a fifth-grade teacher, then that's a very different assessment question. But, to the extent that the certification decision is a much broader one, then I would be obligated as a candidate to make sure that, whatever my immediate experience was, I was competent in the full range of settings for which my certificate would empower me to practice.

Thank you for a very useful and interesting conversation.

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